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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/988,688

11/20/2001

Tsunenobu Hori

11-073

9032

23400

7590

05/20/2004

POSZ & BETHARDS, PLC  
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RESTON, VA 20190

EXAMINER

PERRY, ANTHONY T

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/988,688

Applicant(s)

HORI, TSUNENOBU

Examiner

Anthony T Perry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15, 17, 18, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15, 17, 18, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Response to Amendment***

The Amendment filed on 4/06/2004, has been entered and acknowledged by the Examiner.

Cancellation of claims 16 and 19 has been entered.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 15, 17, 18, and 20 recites the limitation "the tip portion" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson (US 5,430,346).

Regarding claim 1, Johnson teaches a spark plug comprising a metal shell and a center electrode within and insulated from said metal shell (see col. 4, lines 4-12). Johnson teaches that a ground electrode opposes the center electrode defining a spark gap there between, as well as the ground electrode being connected to the metal shell through a laser fused weld (col. 4, lines 42-50).

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Regarding claim 2, Johnson teaches the whole of the ground electrode being made of an alloy (col. 5, line 68 – col. 6, line 3). Johnson teaches the ground electrode being connected at an end thereof directly though a laser fused weld to the metal shell (col. 4, lines 42-50).

Regarding claim 15, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Pt alloy (see Fig. 26 and col. 5, lines 54-58).

Regarding claim 17, Johnson teaches the tip portion (65) of the center electrode (18b) being made of an Ir alloy (see Fig. 26 and col. 5, lines 54-58).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346).

Regarding claim 3, Johnson does not specifically state depth of the weld between the metal shell and the ground electrode. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art.

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Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claim 1 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 4-5, Johnson fails to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claim 1 above, and further in view of Franks (US 3,958,144).

Regarding claim 7, Johnson fails to specifically teach the ground electrode being made of 50 wt% or more of Ir. However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to use the ground electrode comprising of 60wt% of iridium with an additive of nickel, in place of the ground electrode taught by Johnson, so as to provide a spark plug with an improved sparking operation.

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Claims 8-10, 13, 18, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) in view of in view of Franks (US 3,958,144).

Regarding claims 8-9 and 13, Johnson teaches a spark plug comprising a metal shell and a center electrode within and insulated from said metal shell (see col. 4, lines 4-12). Johnson teaches that a ground electrode opposes the center electrode defining a spark gap there between, as well as the ground electrode being connected directly to the metal shell through a laser fused weld (col. 4, lines 42-50). Johnson does not specifically teach the ground electrode being made of an Ir alloy containing a main component of 50wt% or more of Ir.

However, the Franks reference teaches that spark plugs having a ground electrode composed of more than 60 wt% of iridium with an additive of nickel produce a sparking operation considerably improved over previous spark plugs (col. 1, lines 44-64). Accordingly one of ordinary skill in the art would have found it obvious at the time the invention was made to make ground electrode of 60 wt% of iridium with an additive of nickel in order to provide the spark plug with an improved sparking operation.

Regarding claim 10, Johnson does not specifically state depth of the weld between the metal shell and the ground electrode. However, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a workable range for the welding depth so that ground electrode stays secured to metal shell throughout the use of the spark plug, since optimization of workable ranges is considered within the skill of the art.

Reasoning for combination in the rejection of claims 8-9 and 13, above, apply.

Regarding claim 18, Johnson teaches the tip portion (65) of the center electrode (18b) being made of a Pt alloy (see Fig. 26 and col. 5, lines 54-58).

Regarding claim 20, Johnson teaches the tip portion (65) of the center electrode (18b) being made of an Ir alloy (see Fig. 26 and col. 5, lines 54-58).

Regarding claim 21, Johnson teaches the ground electrode being L-shaped (see Fig. 6).

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,430,346) as applied to claims 8-9 and 13 above, and further in view of Takafumi et al. (JP 63-266046).

Regarding claims 11-12, Johnson fails to specifically teach the composition of the metal shell. However, Takafumi teaches a composition of a metal shell for a spark plug that is made of an Fe-based alloy containing 0.15% by weight or less of S, 0.35% by weight or less of Si, 0.25% by weight or less of C, 1.5% by weight or less of Mn, and 0.1% by weight or less of P (see abstract). This composition provides a metal shell with excellent tensile strength (see abstract). Accordingly one of ordinary skill in the art at the time the invention was made would have found it obvious to have the metal shell with the above composition, as taught by Takafumi, so as to provide a spark plug with a metal shell having excellent tensile strength.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeil (US 2,406,966) in view of Johnson (US 5,430,346).

Regarding claims 1 and 6, Fig. 4 of the Pfeil reference shows a spark plug comprising a metal shell (10), a center electrode (5) retained in the metal shell and insulated from the metal shell, and a ground electrode (8) opposed to the center electrode. The ground electrode is welded at an end thereof directly to the metal shell. Pfeil teaches that electrodes are commonly made of a platinum-iridium alloy having 80% platinum and 20% iridium (col. 1, lines 3-7) and that the

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electrode is connected directly to the metal shell by a welding material. Pfeil does not teach specifically teach the weld material being a laser fused weld.

However, Johnson teaches the ground electrode being directly connected to the metal shell through a laser fused welding material (col. 4, lines 42-50). It is well known in the art, that laser welding eliminates the necessity of tightly pressing the objects to be welded together, protecting them from unfavorable deformation. Also, laser welding provides a well-alloyed zone (molten zone) with minimum recrystallization forming a strong bond. Accordingly, it would have been obvious at the time the invention was made to a person having ordinary skills in the art to use laser welding to attach the ground electrode to the metal shell of Pfeil so that the ground electrode and the metal shell are sufficiently molten due to the high density of its energy, producing a spark plug with a strong bond between its ground electrode and shell while also protecting the components from unfavorable deformation.

#### ***Other Prior Art Cited***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Van Uum et al. (US 3,691,419), Kanao (US 6,307,307), and Kagawa (US 5,574,329) teach the advantages of laser welding.

#### **Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is (571) 272-2459. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-24597. **The fax phone number for this Group is (703) 872-9306.**

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [Anthony.perry@uspto.gov].

*All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.*

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Anthony Perry  
Patent Examiner  
Art Unit 2879  
May 17, 2004



Vip Patel  
Primary Examiner  
Art Unit 2879